HEADQUARTERS
32d AAF Base Unit
(Civil Air Patrol)
500 Fifth Avenue
New York 18, New York

TRAINING DIRECTIVE)
NO. 34) 13 October 1944

# INSTRUCTOR'S GUIDE FOR CAP CADET TRAINING

## Table of Contents



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## 1. Texts

a. The preparation of the Preflight Study Manual for CAP by the AAF Office of Flying Safety in cooperation with the Office of Assistant Chief of Air Staff, Training and National Headquarters of Civil Air Patrol makes it possible to offer the first official text for the training of Civil Air Patrol Cadets. This manual covers the minimum of aviation and military knowledge to be acquired by each CAP cadet and, with the exception of a few subjects, by each adult member.

b. The Civil Air Patrol Handbook and other prescribed texts, films, and training aids will be used as supplementary material. However, the initial instruction of cadets will adhere to the scope of the Manual in order to give them a broad picture of the entire field before they go into the details.

## 2. General Plan

Initial instruction will consist of 200 hours of basic training comprised of four 50-hour terms and covering ten major subjects presented in a total of thirty-four courses, as shown in Schedules I and II on pages 6 and 7 hereof, respectively. CAP credit totaling 150 credits will be given for these courses. The basic training will be followed by 60 hours of advanced training in aviation subjects as set forth in paragraph 5, and for which 50 additional CAP credits will be given. After completion of the advanced courses, cadets may take additional CAP courses of their own choosing, as listed in the Handbook. Thus, a cadet, upon reaching the age of 18, may become an adult member with an accumulation of 200 or more CAP training credits.

## 3. Basic Training - Preflight Study Manual

a. The Preflight Study Manual has been prepared as a consolidated text to cover the essentials of CAP courses previously taught from a number of Army and CAP manuals. This will facilitate home study which has heretofore been difficult since it has not been possible to issue each cadet the many books needed.

b. The Manual is divided into ten sections. In order that the section titles may stimulate interest they have been given special captions such as

"Weather in the Making", instead of "Meteorology". Schedule I lists the ten section headings, the courses included under each, the page references to corresponding CAP courses presented in the Handbook, and the CAP credits for each course. Where the number of teaching hours is less than the number of credit hours, the difference represents home study, practice, group discussions, and tests. In the case of Infantry Drill and Morse Code, teaching hours are in excess of credit hours because this represents practice in order to maintain proficiency.

4. Sequence of Instruction - Basic Training

a. The sequence of instruction for the basic training is set forth in Schedule II. Naturally, the first subjects to be undertaken will be "Orientation" and "Essential Facts of Army Life". This will teach the cadet the proper method of wearing his uniform and the military courtesy he will need. Immediately following these two introductory courses will come two aviation subjects, "Airplane Identification" and "Communications". After learning the fundamentals of these two subjects, practice periods in each will carry through the entire 200-hour course. These aviation subjects will run concurrently with the Army training. In addition, the physical aspect of getting one's body in shape to fly will come in this first 50 hours. Immediately at the start of the second 50 hours will come "Theory of Flight", or in simpler terms, "What Makes an Airplane Fly". This course will run concurrently with other subjects throughout the second 50 hours. In like manner, the study of "Meteorology" ("Weather in the Making") is carried through the third 50-hour term concurrently with other subjects, while "Ground Work" and "Navigation" are similarly carried through the fourth term.

b. For military preparation, the policy will be to stress drill, physical exercise, Morse Code, and aircraft identification throughout the basic training. These are subjects which require considerable time in order to attain the necessary proficiency. Other subjects are introduced one by one with a view toward teaching the best that can be offered in a given time as a foundation, both for cadets who will enter the Service and for those who remain in CAP.

c. Holding the interest of the cadets is important to the success of the program. A proper balance must be maintained between military and aviation subjects. Instruction should not run so long on one subject as to become tiresome.

d. It is best to start a class at the beginning of a school term and carry it through according to plans. It is undesirable to introduce individual recruits into classes already under way. In instances where instructors are scarce and recruits are few, this plan may not be feasible. If recruits can be assembled in flights of 20 to 40 and carried through together as separate classes, it will work for greatest efficiency. Note that before they may wear the uniform, recruits are required to take 10 hours of basic training, as follows:- 3 hours CAP Orientation, 3 hours Military Courtesy, and 4 hours Infantry Drill.

5. Advanced Cadet Training

a. CAP cadet training includes no flight training; merely orientation flights to give the feel of flying, without instruction in handling the controls. Cadets who enter the AAF will learn to fly the Army way. Others, with parents' consent, should be encouraged to take flight training from commercial flying schools whenever they can and to qualify as civilian pilots. In the first 200 hours of training, the preflight courses are held to a primary level to the end that basic principles may be thoroughly mastered. Basic training will be followed by 60 hours of instruction which will complete these courses up to full CAP training standards. This advance training consists of nine courses as follows:

| CAP Course No. | Course | Teaching Hours | CAP Credits |
|---|---|---|---|
| 38-2 | Communications (Also review Morse Code and Radiotelephone Procedure) | 5 | 5 |
| 34-3 | Powerplants | 6 | 4 |
| 34-7 | Meteorology | 10 | 7 |
| 37-1 | First Aid | 20 | 16 |
| 34-11 | Accident Causes | 1 | 1 |
| 36-2 | Duties of Servicemen | 4 | 4 |
| 36-3 | Aircraft Inspection | 2 | 3 |
| 36-1 | Crash Procedure | 2 | 2 |
| 34-6 | Navigation | 10 | 8 |
| | Totals | 60 | 50 |

6. Other CAP Training Courses

Some 30 additional courses are listed in Part 3 of the CAP Handbook and more will be added from time to time. After the first 260 hours of instruction, a cadet is still a beginner with much study ahead of him. Among the subjects to be taken before flying, is Civil Air Regulations. Before finishing the 260 hours, cadets may have opportunities to take some of these courses, for which extra credit will be given.

7. Supplemental Training

Academic subjects such as physics and mathematics will be taught in the schools and not by CAP. It is required that cadets undertake these studies as soon as possible. Related subjects such as welding and mechanical drawing may be studied in addition to regular CAP courses.

8. Examinations

A written examination will be given upon completion of each 50-hour term of basic training. After the last of these examinations, there will be a review of the work of the four terms followed by a final written examination covering all of the 34 component courses. A written examination will also be given upon completion of each course of advanced training. Such tests keep the students alert and enable the instructor to determine whether his teaching methods are successful. Questions and quizzes in class will show whether homework is being done.

9. Procurement of Preflight Manuals

Requests for Preflight Study Manuals will be prepared by the local units for transmittal through CAP channels to Wing Headquarters, whence shipments will be made out of Wing stock or requests will be sent on to the proper source of supply. Needs should be planned well in advance to insure proper supply. It is imperative that requests be held to actual needs.

10. Libraries

a. Film Libraries - A library of Army training films and film strips has been furnished to each State Wing and some Group Headquarters for circulation among the local units. Special care will be exercised to see that all films are properly handled and that they are forwarded to the next unit on schedule. Nearby Army posts may cooperate by lending films beyond those available through CAP channels. Many aviation companies have interesting training films which may be available for CAP use.

b. Reference Text Libraries - Each local unit should maintain a reference text library of all available Army and CAP training manuals and texts. This library should be in some accessible place with suitable facilities for reading and taking notes. Duplicate texts may be loaned out, but it is recommended that at least one file copy of each text be kept in the library at all times to insure having all material available when needed.

11. Training Aids

Army and Navy training aids and devices and surplus material useful for CAP training have been shipped to many of the CAP units throughout the 48 Wings. Some of these items are not available in sufficient quantities to supply all needs immediately. Other training aids are being delivered to Wings and Groups for use in training cadets as rapidly as they become available.

12. Instructors

Instructors must have a thorough knowledge of the entire contents of the Preflight Study Manual, because of the inter-relation of the subjects and because the cadets will expect their instructors to know at least as much about the entire course as is required of them. All units should plan ahead so they will have competent instructors for all courses when needed, and alternate instructors to fill in when regular instructors are absent. Where suitable personnel are not to be found in the ranks of CAP, qualified instructors, such as high school teachers, CAA men, airline employees, flight operators, and returned Service men may be found in the community. Local veterans' groups and State Guards or nearby Army posts may supply drill masters. Instructors in all of the preflight subjects may be found at Army Air Bases. The amateur radio associations may be able to help in communications courses. A well planned program is most likely to attract the best instructors.

13. Training Schedules

It is extremely important that each unit make up a schedule of training classes several weeks ahead showing the time and place, the subjects to be

studied, the names of instructors and other pertinent data. Such schedules should be mimeographed and distributed to all the cadets, or at least posted on a conspicuous bulletin board. Be sure that cadets are kept busy at all times. Never hold a meeting where nothing has been previously planned. The successful program is planned well in advance. A sample training schedule is presented in Schedule III on page 8.

14. Corrections to Preflight Study Manual

In the printing of the Preflight Study Manual some mistakes occurred in various sections. These are all listed in Appendix A. Each instructor should go over these corrections carefully with his class and have each student neatly print corrections in proper section of the Manual.

15. Reference Material

Lists of references, supplementary texts, film strips, and training films, together with suggestions and other background material for use in teaching the courses presented in the Preflight Study Manual are presented in Appendix B.

By direction of Colonel JOHNSON, National Commander:

Harry H. Blee

HARRY H. BLEE
Colonel, Air Corps
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OFFICIAL:

Robert A. Buchanan

ROBERT A. BUCHANAN
Captain, Air Corps
Acting Adjutant

DIST:
"Z" (5) (3) (3) (3) (1)

## SCHEDULE I - BASIC TRAINING COURSES

| | Preflight Manual Pages | Course | CAP Course No. | Teaching Hours | CAP Credits |
|---|---|---|---|---|---|
| 1. | CADETS OF THE CAP | | | | |
| | 1-1 - 1-4 | CAP Orientation | 31-1 | 2 | 3 |
| 2. | SOME FACTS OF ARMY LIFE | | | | |
| | 2-1 - 2-4 | Organization of the Army | 31-2 | 1 | 2 |
| | 2-5 - 2-6 | Military Courtesy and Discipline | 32-1 | 2 | 3 |
| | 2-7 - 2-8 | Organization of Army Air Forces | 31-4 | 1 | 2 |
| | 2-9 - 2-10 | Safeguarding Military Information | 32-3 | 1 | 1 |
| | 2-11 | Articles of War | 32-4 | 1 | 1 |
| | 2-12 | Military Correspondence | 32-9 | 1 | 2 |
| | 2-13 | Duties of Command and Staff Officers | 32-7 | 1 | 2 |
| | 2-14 | Leadership and Command | 32-8 | 1 | 3 |
| | 2-15 - 2-18 | Infantry Drill | 32-2 | 42 | 20 |
| | 2-19 - 2-20 | Interior Guard | 32-5 | 1 | 4 |
| | 2-21 - 2-22 | Reviews and Inspections | 32-6 | 1 | 2 |
| 3. | HOW TO SPOT PLANES IN A FLASH | | | | |
| | 3-1 - 3-20 | Aircraft Identification | 33-6 | 20 | 20 |
| 4. | GETTING IN SHAPE TO FLY | | | | |
| | 4-1 - 4-8 | Physical Training | 37-3 | 10 | 10 |
| 5. | COMMUNICATIONS | | | | |
| | 5-1 - 5-5 | Communications | 38-2 | 4 | 1 |
| | 5-6 - 5-26 | International Morse Code | 38-2A | 35 | 10 |
| | 5-27 - 5-32 | Radiotelephone Procedure | 34-9 | 4 | 4 |
| | 5-28 | Phonetic Alphabet | 38-2B | - | 2 |
| 6. | WHAT MAKES AN AIRPLANE FLY | | | | |
| | 6-1 - 6-10 | Theory of Flight | 34-1 | 4 | 6 |
| | 6-11 - 6-13 | Structure of Aircraft | 34-2 | 3 | 3 |
| | 6-14 - 6-18 | Instruments | 34-4 | 6 | 4 |
| | 6-19 - 6-24 | Powerplants | 34-3 | 10 | 6 |
| 7. | WEATHER IN THE MAKING | | | | |
| | 7-1 - 7-20 | Meteorology | 34-7 | 12 | 8 |
| 8. | YOUR BODY IN FLIGHT | | | | |
| | 8-1 - 8-10 | Physiological Aspects of Flying | 37-2 | 2 | 2 |
| | 8-6 - 8-8 | First Aid | 37-1 | 2 | 2 |
| | 8-11 - 8-14 | Flying Safety | 34-11 | 2 | 2 |
| 9. | GROUND WORK | | | | |
| | 9-1 - 9-6 | Airfields | 36-4 | 4 | 4 |
| | 9-9 - 9-11 | Airfield Personnel | 36-10 | 1 | 1 |
| | 9-12 - 9-14 | Duties of Servicemen | 36-2 | 2 | 1 |
| | 9-15 - 9-20 | Aircraft Inspection | 36-3 | 2 | 3 |
| | 9-21 - 9-24 | Crash Procedures and Fire Fighting | 36-1 | 2 | 2 |
| 10. | HOW TO FIND YOUR WAY IN THE SKY | | | | |
| | 10-1 - 10-28 | Navigation | 34-6 | 10 | 7 |
| | 10-3 - 10-15 | Maps and Charts | 34-5 | 8 | 5 |
| | 10-16- 10-20 | Time | 34-15 | 2 | 2 |
| | | | Totals - | 200 | 150 |

## SCHEDULE II - SEQUENCE OF INSTRUCTION

| | | | Total Hours | Min. per wk. |
|---|---|---|---|---|
| **1st 50 Hours** | | | | |
| Section | I | Cadets of CAP | 3) | |
| Section | II | Some Facts of Army Life | 32)* | - 120 |
| | | *(including 20 hours drill 1 hr/wk) | | |
| Section | III | How to Spot Planes in a Flash | 5 | 20 |
| Section | IV | Getting in Shape to Fly | 2* | 10 |
| | | *plus 20 hours of drill above. | | |
| Section | V | Communications | 8 | 30 |
| **2nd 50 Hours** | | | | |
| Section | VI | What Makes an Airplane Fly | 17 | 55 |
| Section | II | I.D.R. & Practice of all courses | 10* | 40 |
| Section | III | Practice | 6 | 20 |
| Section | IV | Practical Exercises | 8 | 30 |
| Section | V | Practice | 9 | 35 |
| **3rd 50 Hours** | | | | |
| Section | VII | Weather in the Making | 12) | - 55 |
| Section | VIII | Your Body in Flight | 5) | |
| Section | II | Same as for 2nd 3 mos. pd. | 10 | 40 |
| Section | III | " " " " " " " | 8 | 30 |
| Section | IV | " " " " " " " | 6 | 20 |
| Section | V | " " " " " " " | 9 | 35 |
| **4th 50 Hours** | | | | |
| Section | IX | Ground Work | 10) | - 105 |
| Section | X | How to Find your Way in the Sky | 20) | |
| Section | II | Same as for 2nd 3 mos. pd. | 8 | 30 |
| Section | III | " " " " " " " | 4 | 15 |
| Section | IV | " " " " " " " | 4 | 15 |
| Section | V | " " " " " " " | 4 | 15 |

Following the first 50-hr. term, <u>every class meeting</u> should include review and practice of sections II, III, IV, and V, inclusive. In addition to these review sections, each class session should include instruction in the additional sections suggested herein, in their entirety and sequence given above.

## SCHEDULE III - SAMPLE TRAINING SCHEDULE

FLIGHT A — All Classes 50 Min. - 10 Min. break between classes -

| | 7:30 to 8:20 | Instructor | 8:30 to 9:20 | Instructor |
|---|---|---|---|---|
| FIRST MEETING (date) | Gen. Arnold's statement History CAP ORIENTATION - Room #10 | LT. KAY | DRILL - Room #3 | SGT. DIX |
| SECOND MEETING (date) | The Uniform What it represents ORIENTATION - Room #10 | LT. KAY | DRILL - Room #3 | SGT. DIX |
| THIRD MEETING (date) | Your job in CAPC ORIENTATION & EXAM. Room #10 | LT. KAY | DRILL - Room #3 | SGT. DIX |
| FOURTH MEETING (date) | MILITARY COURTESY & DISCIPLINE - 1 hr. | LT. RAE | DRILL - 1 hr. | SGT. DIX |
| FIFTH MEETING (date) | ORGANIZATION OF ARMY ½ hr. ORGANIZATION OF AAF ½ hr. | LT. RAE | COMMUNICATIONS 1 hr. | MR. MURPHY |
| SIXTH MEETING (date) | SAFEGUARDING MILITARY INFO. ½ hr. ART. OF WAR - ½ hr. | LT. RAE | DRILL - ½ hr. CODE - ½ hr. | SGT. DIX MR. MURPHY |
| SEVENTH MEETING (date) | PRACTICE PERIOD MILITARY COURTESY REPORTING TO AN OFFICER THE UNIFORM - 1 hr. | LT. RAE | CODE - ½ hr. DRILL - ½ hr. | MR. MURPHY SGT. DIX |
| EIGHTH MEETING (date) | AIRCRAFT IDENTIFICATION ½ hr. CODE ½ hr. | MR. DOE MR. MURPHY | INSPECTIONS & REVIEWS 1 hr. | LT. RAE |
| NINTH MEETING (date) | LEADERSHIP & COMMAND CODE ½ hr. | MR. MURPHY | AIRCRAFT IDENTIFICATION ½ hr. DRILL - ½ hr. | MR. DOE SGT. DIX |
| TENTH MEETING (date) | INTERIOR GUARD - ½ hr. CODE ½ hr. | LT. RAE MR. MURPHY | MILITARY CORRESPONDENCE ½ hr. AIRCRAFT IDENTIFICATION ½ hr. | LT. RAE MR. DOE |
| ELEVENTH MEETING (date) | REVIEWS & DISCUSSION OF SECT. 1 & 2 - 1 hr. | LT. RAE & LT. KAY | CODE - ½ hr. DRILL - ½ hr. | MR. MURPHY SGT. DIX |
| TWELFTH MEETING (date) | EXAMS ON SECT. 1 & 2 - 1 hr. | | AIRCRAFT IDENTIFICATION ½ hr. CODE - ½ hr. | MR. DOE MR. MURPHY |
| THIRTEENTH MEETING (date) | FLYING & THE INNER MAN 1 hr. | DR. JONES | AIRCRAFT IDENTIFICATION ½ hr. DRILL - ½ hr. | MR. DOE SGT. DIX |
| FOURTEENTH MEETING (date) | POSITIVE & NEGATIVE G | DR. JONES | CODE - ½ hr. AIRCRAFT IDENTIFICATION ½ hr. | MR. MURPHY MR. DOE |
| FIFTEENTH MEETING (date) | PHYSICAL EDUCATION 1 hr. | DR. JONES | AIRCRAFT IDENTIFICATION ½ hr. DRILL - ½ hr. | MR. DOE SGT. DIX |

A. Variations in half hour or full hour schedules are permissible if it is more convenient to instructor.

B. If complete Training Schedules are desired, they may be obtained from National Headquarters, CAP, 500 5th Ave., New York 18, N.Y.

## APPENDIX A
## CORRECTIONS FOR THE PREFLIGHT STUDY MANUAL (FIRST PRINTING)

After the first edition of the Preflight Study Manual had been printed, it was discovered that a number of errors had been made in the process of its preparation. Also, certain statements required revision in light of events which had transpired after the text went to press.

There follows a list of corrections to which CAP instructors should refer before teaching the various sections of this Manual:

Page 2 - 1 -- The Services of Supply are now called The Army Service Forces.

Page 2 - 1 -- The definition of the Army Ground Forces should be revised as follows: "The Army Ground Forces, as they are called officially, include as basic arms, the Infantry, Cavalry, Field Artillery and, Coast Artillery".

Page 2 - 1 -- The Quartermaster Insignia opposite the paragraph "Services of Supply" is not correct and should be removed.

Page 2 - 8 -- There are now 16 air forces instead of 15. The latest, designated the 20th, is a global air force available for operations wherever needed.

Section 3 -- Text, photographs, and silhouettes of the B-29, P-61, P-63, and A-26 were prepared for the section, "How to Spot Planes in a Flash". However, at the time the Manual went to press, all four airplanes were still in a confidential classification. It was not until it was too late to include this material in the Manual that the War Department released information about these airplanes to the public. It is suggested that instructors encourage students to find pictures of these airplanes and familiarize themselves with the salient features of each, in addition to studying the airplanes described in the Manual.

Page 5 - 28 -- Niner instead of Ni-yen.

Page 6 - 20 -- The last word in the third line above the subhead, carburetors, should be "superchargers".

Page 6 - 20 -- In the second column, on the line immediately below the diagram of the ignition system, the sentence should read "low-amperage, high-voltage current".

Page 6 - 24 -- The diagram on blue background illustrates an oil temperature gauge, but not one which operates by vapor pressure. The one shown is electrical, operating on the principle of the sensitive element.

Page 7 - 15-- The drawing of Stable Air Condition is not quite complete. It should show the parcel of air rising to about 1800 ft. and there halting, at a temperature of 80°. Arrows should turn downward at that point, indicating that the air rises no further; rather, tends to drop.

Page 10- 3 -- In the right hand diagram at the bottom of the page, the artist made the center sector appear wider than the others. This is a mistake, of course. All such sectors are exactly the same size and no two meridians in this projection are parallel. Make it clear to your Cadets that the lines of longitude and latitude within the red border are the same as those depicted in the center drawing.

Page 10- 4 -- The two outline drawings of U. S. are correct, but the parallels of latitude are not correctly drawn. As you know, the northern border of the U. S. from the Pacific to Lake Superior exactly coincides with a parallel of latitude.

Page 10- 5 -- Explain to your Cadets that the aerial photograph, in relation to the part of the aerial chart within dotted white borders, illustrates Point 4 at the top of the page.

Page 10- 7 -- The grid used on the colored drawing of the globe unfortunately is incorrect in relation to the land masses shown. The equator is in the wrong place and the point 30°N, 60°W, is incorrectly located. It is best to ignore this drawing and use a desk globe to illustrate how to find specific points on the earth's surface in terms of latitude and longitude.

Page 10- 8 -- In the second line above the drawing in the first column, the text should properly read "parallel to the nearest meridian".

Page 10- 10-- The colored symbol illustrating Intermittent Lake should not be solidly filled in. The surface of the lake should be crossed by dotted diagonal lines of blue. Also, explain to the Cadets that the border of the Dry Lake should be a dotted blue line. The symbol for a town of less than 1,000 population should not have a yellow center.

Page 10- 11-- The symbol for radio marker beacon should show the circle filled in with pink.

Page 10- 12-- The symbols at the top of the page are not quite complete. The oval in the Fan Marker Beacon symbol should be filled in with pink. The box should contain a place name, such as Burlington or Sandusky. In teaching these particular symbols, refer to the R-5 Oklahoma City sectional chart rather than the manual. In the second column, the drawing of the airspace reservation should be in red rather than black. Here again, refer to R-5 sectional chart rather than the manual. Also, the symbols for

High Explosive Area should be in red.

Page 10 - 15 -- To make the example conform with the latest type compass card (illustrated), change the 4th and 5th lines of the second column in this manner: "Your compass card indicates: For the nearest bearing (270°): M to C, + 1".

Then change the figure opposite Deviation to + 1° and the figure opposite Compass Course to 269°.

Page 10 - 20 -- In the first line of point 3 in the second column, the text should read "Move horizontally to the left". Omit the words "right or".

Page 10 - 21 and 10 - 22 -- After the first printing of the manual had been made, it was discovered that not enough of the Type D-3 Navigation Computers were available. Therefore, most of the CAP Cadets will receive the newer and more advanced Navigation Computer, Type D-4, an explanation of which follows:

## HOW TO USE THE NAVIGATION COMPUTER, TYPE D-4

The D-4 Navigation Computer, which is also given to every Aviation Cadet at the start of his flight training, is a simple computing device which saves a great deal of time and effort. It helps solve time-distance problems, figure true airspeed from indicated airspeed, correct altimeter readings, and change statute miles to nautical miles and kilometers. It has scales printed on both sides.

### The Time-Distance Side

On the time-distance side of the computer the outer, stationary scale, when used to work a time-distance problem, represents distance. (It is like a slide rule in that the figures have no decimal point. For instance, the figure 15 can represent .15, 1.5, 150, 1500, etc.) The inner, movable disk has two rows of figures and markings. For time-distance problems, they both represent time. The large arrow, marked MPH, is at the 1-hour mark. (Note that, in some cases, the spaces between figures are divided into 10 parts; in other cases, they are divided into 5 parts.)

Here's how you work a problem in time and distance: Suppose, for example, the distance between your point of departure and destination is 300 miles. Your groundspeed is 150 mph. How long will it take to get to your destination? Of course, you can figure this in your head. <u>But work it on the computer</u>.

Set the (MPH) arrow to 15 on the outer scale. That figure, in this instance, represents 150 miles. Now, look below the figure 30 on the outer scale. Immediately below it is 12. That represents 120 minutes. Below 12 is 2:00, representing 2 hours.

Suppose, to take another example, you know how far you've flown and how long it has taken you to do it, but you don't know what your groundspeed is. Let us say you have flown 240 miles in an hour and a half.

To find your groundspeed, set the figure 9 (representing 90 minutes, or 1½ hrs.) on the inner scale opposite 24 (representing 240 miles) on the outer scale. Opposite the MPH arrow is your groundspeed, 160 mph.

Altitude Correction

The time-distance side of your computer has another use. In the section of this manual called "What Makes An Airplane Fly", you are told how changes in barometric pressure and temperature can make an altimeter read incorrectly. On the time-distance side of the D-4 computer you can find corrected or true altitude from the altitude which the altimeter indicates. To do this, set the figure for indicated altitude against the figure for temperature at flight level in the window of the computer.

For example, we'll assume your indicated altitude is 10,000 ft. and the temperature is -20°.

To find your correct altitude, first set the fiture 10 on the Press. Alt. scale opposite -20 on the Air Temp. scale in the computer's window. Now, look above the figure 10 on the edge of the movable disk. You read 94 on the outer scale. In altitude correction problems, both these scales represent feet. The figure 10 stands for 10,000 ft.; the figure 94 represents 9400 ft. In this particular problem, that is your true altitude. The temperature of -20° at 10,000 ft. is lower than normal; therefore your true altitude is less than the altimeter indicates.

Let's try another example: Your indicated altitude is 8000 ft. and the temperature is +20°. To find your true altitude, set 8 on the Press. Alt. scale opposite +20 on the Air Temp. scale. Now, look above the figure 8 (for 8000 ft.) on the edge of the movable disk. You read 86 (8600 ft.). In this example, the actual temperature at 8000 ft. is above normal for that altitude. Accordingly, your true altitude is greater than the altimeter indicates.

Changing the Scale of Miles

On the time-distance side of the computer, you can solve still another kind of problem. For instance, you can change nautical miles to statute miles or kilometers, and vice versa. You do this with the help of the three small arrows on the edge of the computer's movable disk. The kilometer arrow, marked KM, is right beside the large MPH arrow. The Nautical (NAUT.) and statute (STAT.) arrows are left and right of 35 on the same scale.

Here's an example: 100 nautical miles equal how many statute miles or kilometers?

Set the NAUT. arrow to the figure 10 (for 100) on the outer scale, which, in this kind of problem, again represents distance. You find how many statute miles this equals by looking above the STAT. arrow. It points half-way between 11 and 12 on the outer scale. Call it 11.5 and read it as 115. The KM arrow, meanwhile, points at a spot a little more than 2 lines beyond 18 on the outer scale. Call it 18.25 or 182½. To sum up, 100 nautical miles equal 115 statute miles or 182½ kilometers.

Let's try another example: 220 kilometers equal how many statute miles?

Set the KM arrow to 22 (representing 220) on the outer scale. The STAT. arrow points to 13.7 (representing 137). Note that the NAUT. arrow points to 11.9 (or 119). To sum up, 220 kilometers equal 137 statute miles or 119 nautical miles.

## The Airspeed Side

The airspeed side of the D-4 computer is used to determine true airspeed from indicated airspeed. The outer, stationary scale represents calibrated airspeed. For purposes of this course, this is the same as indicated airspeed. The pressure altitude scale, which for purposes of this course, is the same as indicated altitude, is on the inner, movable, disk. True airspeed is read through the window of the inner disk.

This is how you work a problem on the airspeed side of the computer:

Suppose your indicated airspeed is 160 mph, your altitude is 10,000 ft., and the temperature is 0°. You want to find your true airspeed.

Set your altitude (10 on the Pressure Altitude scale) against 160 on the outer scale. Now, in the window, opposite a temperature reading of 0° on the Air Temp. scale, you find your true airspeed, 187 mph.

On the same side of the computer, you see a Density Altitude scale and another air temperature scale. These apply only to certain problems, involving extreme altitudes and high speeds, which are not required in your course.

- 0 -

## APPENDIX B
## REFERENCE MATERIAL FOR USE WITH PREFLIGHT STUDY MANUAL

### SECTION I - CADETS OF THE CAP

1. The purpose of this section is to familiarize new cadets with Civil Air Patrol, its organization, its connection with the Army Air Forces, its traditions and its achievements in the war effort. Instructors who are responsible for this indoctrination should look up some of the many stories of heroism of CAP members told in the National Headquarters Bulletin. Every cadet and CAP member will be proud to belong to a volunteer organization which, in only a few years of existence, has built such an enviable record of unselfish service.

2. Cadets should be taught the names of their Wing, Group, and Squadron Commanders, and Squadron Staff Officers. Every cadet should know the responsible officers appointed over him. For this purpose, it is suggested that tables of organization be prepared similar to those on pages 36 and 37 of the Civil Air Patrol Handbook and in CAP General Memorandum No. 78A, this Headquarters, 5 April 1943.

3. The place of CAP in the community, how the CAP Cadet Program supplements the high school curriculum, and how Civil Air Patrol Cadet Training helps boys win their wings as gunners, bombardiers, navigators, or pilots on AAF combat crews are subjects which should be thoroughly explained to the cadets.

4. Reference Material:
   - a. CAP Handbook - Pages 6-18
   - b. WD LB-X-51 - "How CAP Cadet Training Helps You Win Your Wings"
   - c. Brief History of CAP in front of Handbook
   - d. News Bulletins from National Headquarters
   - e. Facts pertaining to your unit

### SECTION II - SOME FACTS OF ARMY LIFE

1. This section is a condensed Army indoctrinational course. In most cases the text is self-explanatory. It is suggested, therefore, that text material be assigned for outside study and that the classroom hours be devoted mainly to discussions and tests.

| Subjects | Reference Material |
|---|---|
| a. Organization of the Army | CAP TM No. 1 |
| b. Military Courtesy and Discipline | (1) WD FM 21-50<br>(2) Training Film: TF 21-2048, "Military Courtesy", Running Time: 25 min. |

| Subjects | Reference Material |
|---|---|
| c. Organization of the Army Air Forces | CAP TM No. 3 |
| d. Safeguarding Military Information | CAP TD 32-3 |
| e. Articles of War | (1) CAP TD 32-4<br>(2) WD Manual for Courts Martial |
| f. Military Correspondence | CAP TD 32-9 |
| g. Duties of Command and Staff Officers | CAP TM No. 4 |
| h. Leadership and Command | CAP TM No. 5 |
| i. Infantry Drill | (1) WD FM 22-5<br>(2) Training Films:<br>(a) TF 7-248 "Instruction of the Soldier", Running Time: 22 min.<br>(b) TF 7-249 "Instruction of the Soldier", Running Time: 22 min.<br>(c) TF 7-143 "Infantry Drill - The Squad", Running Time: 10 min.<br>(d) TF 7-144 "Infantry Drill - The Platoon", Running Time: 14 min. |
| j. Interior Guard | (1) WD FM 26-5<br>(2) Training Film: AF-119 "Beyond the Line of Duty", Running Time: 25 min. |
| k. Reviews and Inspections | WD FM 1-60 |

## SECTION III - HOW TO SPOT PLANES IN A FLASH

1. Many of the cadets know most of the airplanes better than their instructors can be expected to know them. However, they should be taught to consider this subject in an orderly sequence. To keep up proficiency it is necessary to practice. Therefore, 30 additional half-hour periods throughout the course should be planned, devoted entirely to practice and tests. In keeping with the general scope of the textbook, this section has been limited to American airplanes and to only the most important ones. If time permits, additional airplanes should be included in the course. When instructors are satisfied that all American aircraft are well known, they may add instruction in the appearance and principal features of other Allied airplanes.

2. Training Films:

| | | | |
|---|---|---|---|
| a. | TF 1-900, "Identification of B-17" | Running Time: | 10 min. |
| b. | TF 1-901, "Identification of B-24" | Running Time: | 9 min. |
| c. | TF 1-902, "Identification of A-20" | Running Time: | 10 min. |
| d. | TF 1-904, "Identification of A-24" | Running Time: | 9 min. |
| e. | TF 1-907, "Identification of C-54" | Running Time: | 9 min. |
| f. | TF 1-910, "Identification of P-51" | Running Time: | 10 min. |
| g. | TF 1-912, "Identification of P-39" | Running Time: | 9 min. |

## SECTION IV - GETTING IN SHAPE TO FLY

1. This section is devoted to physical training and is self-explanatory. The AAF requires that men be in perfect physical condition for service on its combat teams. Physical fitness is one of the most essential phases of the cadet training program. The necessity for keeping fit must be emphasized to every cadet.

2. Training Films:

| | | | |
|---|---|---|---|
| a. | TF 1-486, "Swim and Live" | Running Time: | 19 min. |
| b. | TF 8-155, "Personal Hygiene" | Running Time: | 36 min. |

## SECTION V - COMMUNICATIONS

1. Special effort should be made to teach the cadets the Morse Code alphabet in the allotted time and to bring them up to a speed of at least 4 words a minute. Cadets should be encouraged to practice at home and with each other in spare time. Additional half-hour periods are inserted throughout the entire schedule of 200 hours in order that cadets may maintain a proficiency of 4 or more words a minute. Contests will help make the work more interesting. These can be carried on with blinkers or other suitable training aids. Some of the units may have code practice records issued by the Army which can be used to good advantage.

2. Reference Texts:
   a. CAP TD 34-9, "Radio Telephone Procedure"
   b. CAA Bulletin No. 29, "Pilots' Radio Manual" (GPO -25¢)
   c. WD FM 1-45, "Signal Communication"

3. Training Film: TF 1-3310, "Radio Operator", Running Time: 20 min.

## SECTION VI - WHAT MAKES AN AIRPLANE FLY

1. In keeping with the general scope of the Preflight Study Manual, this section explains only basic principles. Mathematics is avoided. The building of model airplanes should be encouraged but, because of time and space limitations, cannot be made part of this course. In explaining

to cadets how aircraft controls work, it is important to utilize the current AAF practice of explaining the functioning of the controls in terms of movement of the nose of the airplane. Visits to airports and demonstrations of airplanes will be of especial value, if they can be arranged in connection with the teaching of this subject. It is desirable to obtain model instruments or actual instruments for classroom use. Most Army air fields have obsolete or salvaged instruments available. All Army pilots are required to be instrument pilots and it is predicted that after the war much civilian flying will be instrument flying.

2. For the study of powerplants, it is highly desirable that each classroom be equipped with a salvaged engine which can be dismantled and reassembled, thus giving the class practical knowledge of aircraft powerplants.

3. Reference Texts:
   a. CAA Bulletin No. 26, "Aerodynamics for Pilots" (GPO 30¢)
   b. CAA Bulletin No. 27, "Pilots' Airplane Manual" (GPO 30¢)
   c. CAA Bulletin No. 28, "Pilots' Powerplant Manual" (GPO 75¢)
   d. AAF Guide

4. Training Films:
   a. TF 1-160, "Aerodynamics - Air Flow"(Show after TF 1-161), Running Time: 15 min.
   b. TF 1-161, "Aerodynamics - Forces Acting on an Airfoil", Running Time: 26 min.
   c. FS 1-8, "Aerodynamics"
   d. SN 805, "Lift and Drag"
   e. SN 807, "Forces in Flight"
   f. TF 1-211, "Airplane Structures", Running Time: 8 min.
   g. TF 1-212, "Airplane Structures - Wing Construction", Running Time: 11 min.
   h. TF 1-213, "Airplane Structures - Fuselage Construction", Running Time: 8 min.
   i. TF 1-246, "Airplane Propellers", Running Time: 19 min.
   j. FS 1-418, "Introduction to Airplane Structures"
   k. TF 1-800, "Aircraft Instruments", Running Time: 13 min.
   l. FS 1-23, "Introduction to Airplane Instruments"
   m. FS 1-15, "Principles of Internal Combustion Engines"
   n. FS 1-72, "Aircraft Engine Operation"

## SECTION VII - WEATHER IN THE MAKING

1. Meteorology is one of the most important and interesting subjects in the Manual. Weather may ground an entire air force. A change in weather after a combat mission has left its base may call for expert knowledge of meteorology on the part of the pilot in order that he may accomplish his mission and bring his crew back safely. Much information is available in the form of Army manuals and training films.

2. Reference Texts:
   a. WD TM 1-230, "Weather Manual for Pilots"
   b. WD TM 1-231, "Elementary Weather for Pilot Trainees"
   c. CAA Bulletin No. 25, "Meteorology" (GPO 25¢)

3. Training Films and Strips:
   a. TF AF 104, "Meteorology - Fog", Running Time: 22 min.
   b. TF AF 106, "Meteorology - Temperature and Winds", Running Time: 41 min.
   c. TF 1-133, "Modern Weather Theory and Structure of Storms", Running Time: 19 min.
   d. TF 1-134, "Modern Weather Theory and Structure of Storms", Running Time: 14 min.
   e. SN 814, "Air Oceans"
   f. SN 815, "Air Masses"

## SECTION VIII - YOUR BODY IN FLIGHT

1. This section deals with the physiological aspects of flying. An understanding of what happens to the human body when it is subjected to the unusual conditions of flight is of crucial importance to flying safety. Where possible, medical officers should teach this section.

2. Physiological Aspects of Flying:
   a. Reference Texts:
      (1) AAF Guide - Pages 242-243
      (2) WD TM 1-705, "Physiological Aspects of Flying and Maintenance of Physical Fitness"
   b. Training Film: FS 8-35, "Control of Hemorrhages"

3. First Aid:
   a. Reference Text: American Red Cross First Aid Text for Civilians
   b. Training Films:
      (1) TF MN-299a-T, "Essentials of First Aid", Running Time: 30 min.
      (2) TF 8-2047, "First Aid for Battle Injuries", Running Time: 28 min.
      (3) TF 8-2049, "First Aid for Non-Battle Injuries", Running Time: 29 min.
      (4) FS 8-70, "First Aid for Non-Combat Injuries"
      (5) FS 8-41, "Emergency Measures for Wounds and Their Immediate Complications"

## SECTION IX - GROUND WORK

1. It is hoped that a large part of this instruction can be conducted at air fields. The text in this section is largely self-explanatory. Home study is recommended so that most of the alloted time can be used for discussion and tests.

2. Reference Texts:
   a. AAF Guide
   b. WD TM 1-415, "Airplane Inspection Guide"
   c. CAP TD 36-2, "Duties of Servicemen"
   d. CAP Manual No. 36-1, "Crash Procedure"

3. Training Film: TF 1-3312, "Army Flying Regulations"
   Running Time: 13 min.

## SECTION X - HOW TO FIND YOUR WAY IN THE SKY

1. The subject of navigation is particularly attractive to the student. A sufficient number of sample sectional aeronautical charts (Oklahoma City (H-5)) has been distributed to all units to meet present requirements of the cadet training program. A typical problem based on this chart is presented in the Preflight Study Manual. Other problems should be worked out on this chart until the students have a complete knowledge of all map symbols and a wide familiarity with the fundamental navigation problems of contact flight and dead reckoning. A supply of air navigation computers is available through National Headquarters. Students should be thoroughly instructed in the use of the computer and be able to work typical problems before proceeding to the study of the wind triangle. Instructions for the use of the D-4 Computer are presented in Appendix A.

2. Reference Texts:
   a. WD TM 1-205, "Air Navigation"
   b. CAA Bulletin No. 24, "Practical Air Navigation" (GPO $1.00)

3. Training Films:
   a. TF 1-245, "Aerial Navigation - Maps and the Compass",
      Running time: 13 min.
   b. TF 1-326, "Aerial Navigation - Dead Reckoning",
      Running Time: 26 min.

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## GLOSSARY

| | | |
|---|---|---|
| AAF | ..... | Army Air Forces |
| CAA | ..... | Civil Aeronautics Administration |
| FM | ..... | Field Manual |
| FS | ..... | Film Strip |
| GPO | ..... | Government Printing Office (Wash. D.C.) |
| MN | ..... | Navy Motion Picture |
| SN | ..... | Navy Film Strip |
| TD | ..... | Training Directive |
| TF | ..... | Training Film |
| TM | ..... | Technical Manual |
| WD | ..... | War Department |

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